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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* A. ALAN BURKE and LOUIS G. CARREIRO

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Appeal 2012-006299  
Application 12/560,786  
Technology Center 1700

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Before BRADLEY R. GARRIS, ROMULO H. DELMENDO, and  
DONNA M. PRAISS, *Administrative Patent Judges*.

*PER CURIAM*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134, Appellants appeal from the Examiner's rejections under 35 U.S.C. § 103(a) of claims 1-3 as unpatentable over Lightner (U.S. 2002/0086192 A1, published Jul. 4, 2002) in view of McElroy (U.S. 2005/0214609 A1, published Sep. 29, 2005) and of claim 4 as unpatentable over these references and further in view of Schramm (U.S. 5,079,103, issued Jan. 7, 1992). We have jurisdiction under 35 U.S.C. § 6.

We AFFIRM.

Appellants claim an apparatus for converting hydrocarbon fuels into hydrogen rich reformat streams (while sequestering carbon dioxide gas) for use with a high-temperature fuel cell comprising a liquid hydrocarbon feed 14, a fuel reformer 18, a first carbon dioxide scrubber 22, a high-temperature fuel cell 10, a recycle pump 24, and a second carbon dioxide scrubber 20 (sole independent claim 1; Fig. 1).

A copy of representative claim 1, taken from the Claims Appendix of the Appeal Brief, appears below.

1. An apparatus converting hydrocarbon fuels into hydrogen rich reformat streams while also sequestering carbon dioxide gas for use with a high temperature fuel cell comprising:

a liquid hydrocarbon feed that contains a liquid hydrocarbon fuel;

a fuel reformer joined to said liquid hydrocarbon feed wherein said fuel reformer receives and [sic] the liquid hydrocarbon fuel from said liquid hydrocarbon feed and reforms it into a reformer effluent gas;

- a first carbon dioxide scrubber joined to said fuel reformer that receives the reformer effluent gas and removes carbon dioxide from the reformer effluent gas and heats the reformer effluent gas thereby producing a scrubbed reformat effluent gas that is heated to a predetermined temperature range;
- a high temperature fuel cell joined to said first carbon dioxide scrubber that receives the scrubbed reformat effluent gas that serves as a fuel to power the fuel cell, wherein said high temperature fuel cell partially oxidizes the scrubbed reformat effluent gas into a fuel cell exhaust gas;
- a recycle pump that receives said fuel cell exhaust gas from the high temperature fuel cell for the purpose of recycling the fuel cell exhaust gas; and
- a second carbon dioxide scrubber joined to said recycle pump and joined to said fuel reformer, wherein said second carbon dioxide scrubber receives the fuel cell exhaust gas from the recycle pump and removes carbon dioxide from the fuel cell exhaust gas and heats the fuel cell exhaust gas before channeling it to the fuel reformer wherein the scrubbed and heated fuel cell exhaust gas is mixed with the liquid hydrocarbon fuel, wherein the heat from the scrubbed and heated fuel cell exhaust gas drives and sustains the operation of the fuel reformer.

We will sustain these rejections based on the findings of fact, conclusions of law, and rebuttals to arguments expressed by the Examiner in

the Answer. The comments below are added for emphasis and completeness.

We share the Examiner's finding that apparatus claims 1-3 differ from the Lightner apparatus only with respect to the recycle pump and second carbon dioxide scrubber of claim 1 and the solid oxide fuel cell of claim 2 (Ans. 4-5). Appellants' arguments against this finding are not persuasive for the reasons given by the Examiner (*id.* at 6-8).

For example, Appellants' argument that Lightner does not teach a first carbon dioxide scrubber joined to a fuel reformer (Br. 8) is based on the incorrect proposition that claim 1 requires these structures to be directly joined to one another. Similarly, Appellants' contention that the fuel cell of Lightner is not a high-temperature fuel cell (*id.* at 9) is merely an assertion unsupported by evidence. Finally, Appellants' characterization of Lightner as "a confusing and erroneous reference . . . rendering it ineffective as a prior art reference" (*id.* at 10) is not supported by evidence refuting the presumption that the Lightner publication is enabling. *See In re Antor Media Corp.*, 689 F.3d 1282, 1288 (Fed. Cir. 2012) ("we now hold that a prior art printed publication cited by an examiner is presumptively enabling barring any showing to the contrary by a patent applicant").

We also share the Examiner's conclusion that it would have been obvious to provide the Lightner apparatus with a recycle pump and a second carbon dioxide scrubber as required by claim 1 in order "to reuse and recycle the fuel cell exhaust and increase system efficiency as suggested by McElroy" (Ans. 5) and to use as the fuel cell in this apparatus a solid oxide fuel cell as required by claim 2 in view of McElroy's disclosure that such

fuel cells are well known in this art (*id.*). Appellants' contrary view lacks convincing merit as fully explained by the Examiner (*id.* at 8-9).

For example, Appellants argue that "the fuel exhaust processing subsystem in McElroy is a different design and performs a different function (separating out three components, water vapor, carbon dioxide and hydrogen) than the second carbon dioxide scrubber as claimed in Appellants' claim 1" (Br. 12). However, Appellants do not identify any structural limitation of the second carbon dioxide scrubber required by claim 1 which is not satisfied by the carbon dioxide scrubbing unit in McElroy's fuel exhaust processing subsystem. Regarding claim 2, Appellants further argue that an artisan would not use McElroy's solid oxide fuel cell in the Lightner apparatus because "such a cell cannot easily be substituted for a proton exchange membrane hydrogen fuel cell" (*id.*). This argument is not persuasive because Appellants have not provided any legal authority for the proposition that obviousness requires a proposed substitution to be easy.

Additionally concerning the rejection of claims 1-3, Appellants state that "neither McElroy nor Lightner claim to use the waste heat from the fuel cell and exothermic carbon dioxide scrubbers to drive the endothermic steam reforming of liquid hydrocarbon fuel, which is the basis of the Appellants' present invention" (*id.* at 12-13). Although Appellants do not associate this statement with any particular claim limitation, the statement appears to be directed to the second carbon dioxide scrubber recitation "wherein the heat from the scrubbed and heated fuel cell exhaust gas drives and sustains the operation of the fuel reformer" (claim 1). The Examiner finds that the apparatus of Lightner and McElroy are capable of performing the recited function (Ans. 8). *See In re Schreiber*, 128 F.3d 1473, 1478 (Fed. Cir. 1997)

(holding a functional limitation to be satisfied by prior art reasonably believed to be inherently capable of performing the function). Significantly, Appellants have not contested this finding in the record before us.

Regarding the claim 4 rejection based on Lightner, McElroy and Schramm, Appellants argue that "the purge disclosed by Schramm is not equivalent to what is taught in claim 4" (Br. 13). The deficiency of this argument is that Appellants have not identified what aspect of the claim 4 purge is considered to be not satisfied by the apparatus resulting from the prior art combination proposed by the Examiner. Based on the appeal record, it appears to us that the resulting apparatus would possess the inherent capability of purging gas in order "to prevent over-pressurization and to remove diluents" (claim 4).

For the reasons stated above and in the Answer, we sustain each of the § 103 rejections before us in this appeal.

The decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R §1.136(a).

**AFFIRMED**

kmm